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Vaccine Hesitancy in the United States and Switzerland

Vaccine Hesitancy in the United States and Switzerland

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Spring Semester, 2019

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## **Abstract**

Vaccine hesitancy (VH), or the reluctance or refusal to participate in vaccination programs, is a complex phenomenon with far-reaching impacts on society. VH can impact vaccine uptake and facilitate subsequent outbreaks, as seen with the case of measles. Perceptions of vaccination are similar in the United States and Switzerland, and misinformation in each country contributed to VH through impaired parental risk-benefit analysis; parental analysis and subsequent VH is associated with both anti-vaccination messages gaining prominence and a decrease in the public perception of the health risk from vaccine-preventable diseases (VPDs). There are many proposed strategies for addressing VH on both clinical and public health levels, most of which center around communication. So far, no single strategy has been shown to be most effective. The literature and the interviews included multiple possible strategies to be tested in the future.

## **Acknowledgements**

This research project would not have been possible without the help of many individuals. First off, I would like to thank the interviewees. Dr. Nicolas Peyraud was not only helpful in his interview content about vaccine hesitancy, but shared a wealth of articles and was instrumental with offering possible contacts of other interviewees. Dr. William Stauffer was helpful in his introduction to vaccine hesitancy in the United States and for putting me in contact with Ms. Bahta. Ms. Lynn Bahta was incredible with sharing her knowledge and experience with vaccine hesitancy in the United States. The anonymous interviewee was kind in offering her perspective as a vaccine-hesitant parent in Switzerland. Dr. Anne Golaz offered interesting rebuttals to the

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VH perceptions of the medical system in Switzerland. Mr. Michael Deml was helpful in sharing his nuanced perspectives of vaccine hesitancy. Dr. Alessandro Diana was incredibly kind offering his time, knowledge, and experience amidst a busy schedule. Thank you to the interviewees for all of their insights, perspectives, and experiences, as well as for taking the time for an undergraduate researcher. There were many stories that I wish I could have included in this paper but due to space constraints could not; I appreciated them nonetheless.

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## Introduction

Vaccine hesitancy (VH) has existed since the dawn of vaccination, yet in recent years there has been a marked increase in vaccine-preventable diseases (VPDs), especially pertussis and measles (Gowda & Dempsey, 2013). One of the largest contributions to this recent hesitancy was a fraudulent paper published in *The Lancet* by Andrew Wakefield in 1998 and later retracted which claimed that the Measles Mumps and Rubella (MMR) vaccine was linked to autism (Wakefield et al., 1998). This claim was quickly, thoroughly, and repeatedly refuted by the scientific community, with one example being a cohort study of all children born in Denmark for nine years that showed no evidence for the link between the MMR vaccine and autism (Madsen et al., 2002), yet the increased hesitancy towards vaccination remained. As subsequent studies refuted other fears of vaccination, new hypotheses about how vaccines negatively affect human health would be proposed (Gerber & Offit, 2010). This propagated VH as the scientific community had to subsequently refute each individual anti-vaccination claim, a slow process with significant time lag, allowing VH to increase.

Throughout the duration of these false claims, VH has increased and public confidence in the medical and scientific communities has decreased. This is a large problem as vaccines protect from suffering and death that comes from VPDs and they are one of the most cost-effective ways of avoiding disease. The World Health Organization (WHO) has listed VH as one of the top ten threats to global health in 2019 (World Health Organization, n.d.). Already, preliminary surveillance data for 2019 indicate that the number of reported of measles cases is 300% greater in 2019 than by this the same time last year in April 2018 (World Health Organization, 2019a).

Given the problem's magnitude, this research project is on the topic of VH with a focus on a comparison between the United States and Switzerland. The research question is as follows:

What are the similarities and differences between the United States and Switzerland in vaccination perceptions and in the strategies to address VH?

This research fits into the global conversation on vaccine hesitancy as it is important to understand the impact of vaccine hesitancy around the world and to have more communication designed specifically for spreading effective strategies for addressing vaccine hesitancy.

This research will be presented as follows: research methodology, a literature review, analysis, and a conclusion. The analysis will begin with information about the current impact of vaccine hesitancy on coverage rates and the resulting outbreaks before moving to a discussion of perceptions of vaccinations in the United States and Switzerland, and the analysis will conclude with current and future strategies for addressing vaccine hesitancy.

### **Research methodology**

The data in this study include both primary and secondary data collection. The secondary data include a literature review of the field of vaccinology. This covers grey literature, like the national vaccination strategy of Switzerland, and scientific literature, such as the analysis of various vaccination programs. Data were found through online searches through NCBI:PubMed, simple Google searches, and through scientific articles shared by interviewees. The document selection was based on relevance to the research question. Documents that gave a broad overview about the topic that were relevant but not country-specific, such as the SAGE Working Report, were included as they gave important context and a larger reference frame for the issue. Grey literature was mainly found through searching official government websites of the United States and Switzerland for any pages relevant to vaccinations, vaccine policies, or vaccine hesitancy.

Primary data were collected through interviews. The vast majority of interviews were with experts in the field, save for the interview with an anonymous vaccine-hesitant individual who was interviewed in order to gain more information about the perspectives of a vaccine-hesitant Swiss citizen and parent. The interview with the anonymous Swiss parent was an informal, semi-structured interview. The other interviews included both formal and informal interviews with experts in the field. These were all semi-structured interviews. All of the primary data was qualitative in nature. Interviewees were selected based upon their knowledge of and/or clinical experience with vaccine hesitancy.

This interview approach was utilized in order to gain information about vaccine hesitancy from those with expertise, but more specifically in order to get perspectives of those that have first-hand experience with vaccine hesitancy. The first-hand experience was important for clinical strategies and examples of the experiences of health providers in both countries, but it was also helpful in adding the personal perspective of a vaccine-hesitant individual in Switzerland to confirm the data found in the literature, (specifically, a review of opinions of vaccine hesitant individuals).

Data analysis included a comparative strategy between the literature of both countries and between the experiences of health providers in both Switzerland and the United States. The data from the interviews was compared to what was reported in the literature, then integrated into the story presented on vaccine hesitancy.

Ethical considerations to be taken into account with this study include the issues of anonymity and quoting within context. The vaccine hesitant individual did not want to be named, even though they were adamant in their opinions, due to concerns about public opinion and potential issues with their employer. Another ethical consideration includes ensuring appropriate

quoting from interviews as this is a sensitive topic and out-of-context quotes could be misconstrued and cost an expert their public integrity or even their job. For this reason, multiple interviewers requested to see the final report before it was finalized. There was prior approval by the local Human Subjects Review board for the interviews. There are no conflicts of interests to declare.

Difficulties in this research mainly centered around access. There were experts in Switzerland who would have been helpful to include as interviewees, although due to their work responsibilities were not available for an interview with an undergraduate researcher. Other issues include the small sample size of interviewees to be included in the primary data. The study requirements listed only three interviewees, and this study included seven interviews. While this was helpful in adding to the secondary data collected and analyzed in the scientific literature, it was not enough to stand alone or be statistically significant without literature support. A limitation potentially perceived by the vaccine-hesitant community is the presence of preferential bias for vaccination and vaccine safety given that a portion of the study is focused on increasing vaccine coverage.

### **Literature Review**

There is a plethora of literature refuting the claims of the 1998 paper in *The Lancet* claiming a link between the MMR vaccine and autism. One early example was a retroactive cohort study of 537,303 children. MMR vaccine administration was compared against autism and autistic-spectrum disorder diagnoses and, after adjusting for potential confounders, Madsen *et al.* reported that, “there was no increase in risk of autistic disorder or other autism-spectrum disorders among vaccinated children as compared with unvaccinated children...” and that “there was no association between the age at the time of vaccination, the time since vaccination, or the

date of vaccination and the development of autistic disorder,” (Madsen et al., 2002, pages 1479-1480, 1477). Later, following the retraction of Wakefield’s Lancet article in 2010, an editorial in The British Medical Journal clearly summarized the initial fraudulent work by Wakefield as well as the scientific response over the next decade. It covered the initial scientific backlash against the popular assumptions about the paper, such as it being a small case series with no controls and it linked three common conditions, the original investigation into the paper by journalist Brian Deer, and the subsequent un-earthing of multiple violations of scientific integrity committed during the course of the study. Ultimately, the editorial aimed to put to rest once and for all that vaccines do not cause autism, as even the initial paper claiming the association was full of fraud (Godlee, Smith, & Marcovitch, 2011). Even as the Wakefield paper was shown to be false, other claims against the safety of vaccination were formed. A review article presented three of the hypotheses proposed against population vaccination and the evidence against each of these claims. The first hypothesis was proposed by Wakefield that the MMR vaccine caused autism by damaging the protective intestinal lining allowing encephalopathic proteins to enter the bloodstream. The second hypothesis which emerged after the Wakefield paper repudiation was that the danger of vaccines was actually thimerosal, a mercury derivative in vaccine preparations, acting as a toxin to the central nervous system. The third and final hypothesis emerged after the dismissal of the previous two claims was that the administration of multiple vaccines simultaneously overwhelms the immune system. The article summarized multiple studies with different approaches analyzing populations from across the world giving evidence to fully disprove each of the three claims (Gerber & Offit, 2009).

Despite the research demonstrating the claims against vaccines were false, VH persists. A 2013 review article by Dubé *et al.* and a 2014 report by the WHO’s SAGE Working Group

outlined many of the causes and determinants of VH, as well as what is known about current strategies to address it. Overall, when addressing VH, the use of multiple concurrent strategies was shown to be more effective than a singular approach (SAGE Working Group, 2014). It is also noteworthy that no singular strategy in the literature has been shown to be the most effective (Dubé et al., 2015). The SAGE Working Group interventions with the greatest positive effects include targeting unvaccinated or under-vaccinated populations, increasing knowledge and awareness about vaccines, improving access to vaccines, mandating vaccinations, using reminders and follow-up calls, and engaging with community leaders to promote vaccination. Yet, even among this compilation of the most effective strategies, none were seen as sufficient to globally address VH (SAGE Working Group, 2014).

National strategies for vaccination exist in both the United States and Switzerland. The Federal Office of Public Health (FOPH) wrote the National Vaccination Strategy for Switzerland (Federal Office of Public Health, 2017). The U.S. Department for Health and Human Services (HHS) wrote the National Vaccine Plan for the United States (U.S. Department of Health and Human Services, 2016). Both include information about top-down strategies aimed at increasing coverage rates, and while neither explicitly mention VH they implicitly target VH by addressing barriers to vaccination. More analysis of these plans will be included in the Public Health section of the Strategies division of Analysis.

The literature includes data and review summaries refuting the claims of the anti-vaccination movement, summaries of vaccine hesitancy, and national strategies to increase vaccination. However, there is little on the perceptions of the vaccine hesitant, especially from an anthropological point of view, and little on effective strategies for health-care workers working with vaccine-hesitant patients in a clinical setting. There is ongoing work in Switzerland being

done to address a few of these gaps, such as the work by the lab of PhD-candidate Michael Deml investigating perceptions of vaccination in Switzerland.

## **Analysis**

### **1. Coverage and Consequences**

Measles will be used as a case example of vaccine coverages and outbreak rates between the United States and Switzerland because it is rising in prominence as a public health threat and there are data in both countries on this specific disease. The WHO states that there must be at least a 95% vaccination coverage rate with both doses of the measles vaccine in order to achieve herd immunity and prevent measles transmission within the population (World Health Organization, 2018).

The United States consistently uses a National Immunization Survey (NIS) to collect estimates about vaccination coverage. Measles vaccine coverage of 19-35 month olds in 2017 for at least the first dose was 91.5%. The NIS also stated that an increasing proportion of children had received no vaccines by age two, up to 1.3% (Hill et al., 2018). For 13-17 year olds nationally in 2017, 92.1% had received at least two doses of the measles vaccine (Walker et al., 2018). Both of these age groups are below the WHO's recommendation of 95% for herd immunity. However, the United States does not have a homogeneous vaccination coverage. In 2017 for 19-35 month olds, the states with the highest vaccination coverage were Massachusetts (98.3%), Virginia (97.6%), and North Dakota (95.7%) while the states with the lowest coverage were Missouri (85.8%), Indiana (87%), and Colorado (87.2%) (CDC, 2018b). In 2017 for 13-17 year olds, the states with the highest coverage were Georgia (97.7%), Massachusetts (95.7%),

and Michigan (97.4%) while the states with the lowest coverage were Texas (84.7%), West Virginia (85%), and Missouri (87.6%) (CDC, 2017).

Many specific populations within states that have a high overall coverage are well below the recommended 95% coverage rate, increasing the potential for and occurrence of outbreaks. The Center for Disease Control and Prevention (CDC) reported 120 cases of measles in 2017, 372 cases in 2018, and 555 cases so far in 2019 as of April 11, 2019 (CDC, 2019a). In 2017, there was a 75-case outbreak in Minnesota in a Somali-American community that had low vaccination coverage (CDC, 2019a). This is despite the fact that Minnesota has a 94.3% vaccination coverage rate overall for 19-35 month olds (Hill et al., 2018). Another population that can lead to potential outbreaks are those that were vaccinated for measles anytime from 1963 to 1967 with a killed virus rather than a live virus, as it does not confer life-long protection like the live-virus vaccine (CDC, 2019b). This population may believe that they're immune but without a booster vaccination they could contribute to spreading measles. These two cases show how even when a state has a relatively high vaccination coverage rate, there can be clusters of lower vaccination rates or lower protection that allow the spread of vaccine-preventable diseases.

Switzerland does not have consistent surveys of vaccination coverage like the United States, but the FOPH released coverage estimates for 2014-2016 for three ages—for two-year-olds, the national coverage was 94% for the first dose of the measles vaccine and 87% for the second dose, for eight-year-olds, 95% for the first dose and 92% for the second dose, and for sixteen-year-olds it was 96% for the first dose and 93% for the second dose. Yet, only the Canton of Geneva achieved at least 95% coverage for both doses in two-year-olds (Office fédéral de la santé publique, 2018). These results, however, are only for children and not the general population. Valeri *et al.* showed that vaccination coverage in Switzerland is most likely much

below the recommended 95% coverage. Their coverage estimates for the measles vaccine was 76.5% and 49.4% for one and two doses, respectively, for the cohort born in the years 1967-1992. For those born on or before 1966, the estimates were 4.0% and .8% for one and two doses, respectively. The article itself states that the results are not generalizable due to selection bias and low participation, but that the results indicate that further research is required (Valeri et al., 2014). Multiple studies indicating lower coverage than the WHO's recommended 95% suggest that Switzerland is at risk for measles outbreaks.

Despite Switzerland having a much smaller population than the United States (8.6 versus 328 million, respectively), the two countries have had comparable numbers of measles cases in the last few years (Population, n.d.). The FOPH reported 105 cases in 2017, 48 cases in 2018, and 136 cases so far in 2019 (Office fédéral de la santé publique OFSP, 2018). These cases were not distributed equally throughout Switzerland. The Canton of Geneva, for example since it was the Canton with the highest vaccination coverage rate for two-year-olds, had one case in 2017 and zero in 2018 (Office fédéral de la santé publique, 2018).

Both the United States and Switzerland are using estimates for the coverage rates, as neither have required national vaccination records. Neither country has homogeneity of coverage rates nor outbreak occurrences. The United States had higher coverage for toddlers while Switzerland had higher coverage for teenagers. The WHO had data on the total number of confirmed cases in 2018 (372 cases for the U.S. consistent with the CDC data, 51 cases for Switzerland which was greater than the FOPH data) and on the incident rates—in the United States, the measles incidence rate per 1,000,000 people was 1.15 while in Switzerland it was 6.07 (World Health Organization, 2019b). A nearly six times higher incidence rate of measles is astounding, and calls for further study. The lower vaccination estimates of adults by Valeri *et al.*

combined with the incidence rate of measles suggest that the actual vaccination coverage is much lower than the WHO's recommended 95% rate.

These data give a scope of the magnitude of the problem, and an impetus for why its study is important. While vaccine uptake is not synonymous with vaccine confidence, vaccine hesitancy is one cause of reduced vaccine coverage. Poor coverage rates allow for outbreaks to spread, causing public health issues. Next, the perceptions that lead to hesitancy will be analyzed.

## **2. Perception**

### **a. Causes of vaccine hesitancy.**

There is no one singular cause for vaccine hesitancy. The literature offers a plethora of causes, as did each of the interviewees. Even a single individual is likely to have multiple reasons for their decision making. In an interview with a Swiss pediatrician and vaccination advisor to Médecins Sans Frontières, Dr. Peyraud, Dr. Peyraud mentioned how every consultation is different and there needs to be an interactive relationship between the pediatrician and parent (N. Peyraud, personal communication, March 26, 2019). In an interview with a US physician and infectious disease specialist, Dr. Stauffer, he mentioned how the VH he sees even varies by vaccine. In his travel clinic, patients will want certain vaccines like Yellow Fever but not their routine vaccinations, (W. Stauffer, personal communication, March 20, 2019). Dr. Peyraud witnessed this as well, how some would want one vaccination but not another (N. Peyraud, personal communication, March 26, 2019). Dr. Diana saw this and called it “à la carte vaccination” as parent/patient picks and chooses which vaccines to get (A. Diana, personal communication, April 12, 2019).

Even with this variation, the literature has studies on the most common causes and determinants of vaccine hesitancy. The SAGE Working Group on Vaccine Hesitancy, a group of experts formed by the WHO, put forth a list of determinants of vaccine hesitancy. Contextual influences, individual and group influences, and vaccine-specific issues were concluded to be major driving factors. Contextual influences include: the media, historical influences, politics, influential leaders, religion, culture, socioeconomic status, and perceptions of the pharmaceutical industry. Individual and group influences include the experiences of the parent/patient or their family or community, their beliefs about health, and social norms. Vaccine-specific issues include, but are not limited to, the type of vaccination program, the vaccination schedule, the costs, and the attitudes of healthcare providers. The SAGE Working Group also identified education as a determinant of VH, although more research is needed since there was geographic variance with this determinant. Studies from China, Lebanon, Israel, Bangladesh, and the United States had increased education as a possible barrier to vaccination while studies from Greece, the Netherlands, Nigeria, and Pakistan showed the opposite trend (SAGE Working Group, 2014).

There are other literature-identified causes of vaccine hesitancy that are more succinct. A WHO-UNICEF Joint Reporting Forum noted that the top three reasons for vaccine hesitancy were (1) beliefs and attitudes about health and prevention, (2) perceived risks and benefits of vaccines, and (3) the communication and media environment (Larson et al., 2015). This report included many of the main determinants as the SAGE report, though there were additional issues, such as the lack of perceived risk of VPDs, that were mentioned explicitly in this publication and not in the SAGE Report.

A review by Dubé *et al.* identified more specific causes of vaccine hesitancy; these are in accordance with the SAGE Working Group determinants. Within the sociocultural context, a

person's own experiences as well as their families' and friends' experiences with health services impact vaccine acceptance (Dubé et al., 2013). Public scares, like in the 1990s with a baseless association between the Hepatitis B vaccine and multiple sclerosis or the 1998 fraudulent Wakefield paper associating the MMR vaccine and autism, impact vaccine hesitancy as well. In fact, "fear of autism is still today a frequently reported vaccine safety concern among parents in different settings," (Dubé et al., 2014, page 1765). Knowledge about vaccines, parents' concern about a child's pain from shots, perceptions of the risk of vaccinating versus not vaccinating, provider communication, distrust of pro-vaccine motives, and social responsibility were all mentioned as impacting an individual's decision-making process regarding vaccination (Dubé et al., 2013). This literature supports what Dr. Diana, a pediatrician, infectious disease specialist, and vaccinologist in Geneva, Switzerland, stated regarding the causes of vaccine hesitancy—it's multifactorial (A. Diana, personal communication, April 12, 2019).

During an interview with an anonymous vaccine-hesitant parent in Switzerland, the interviewee mentioned many concerns, also identified in the literature, for personal vaccine hesitancy. She spoke about how she didn't want to overburden the immune system of her children; she worried about toxic ingredients in vaccines; she had concerns about conflicts of interests with pharmaceutical companies and governments; she feared being affected by the biases of physicians. Overall, she felt like she balanced the risk of vaccines versus the risk of disease and found the risk of vaccination to be greater than the potential benefit (Anonymous individual, personal communication, March 28, 2019).

A leading public health nurse in the United States from the Minnesota Department of Public Health, Ms. Lynn Bahta, mentioned seeing many similar motivations in those that are vaccine hesitant. She looks at VH as a spectrum and, many like the individual in Switzerland

have done “homework” on vaccines or have been instructed by “wiser” people to not get certain vaccinations, which causes hesitancy (L. Bahta, personal communication, April 3, 2019). She also spoke about how the most common motivation for VH is anger. The vaccine-hesitant population typically has powerful anecdotes, like a child having a fever a few hours after a vaccine and never being the same again, and subsequent feelings of betrayal and grief (L. Bahta, personal communication, April 3, 2019). Healthcare providers need exhibit caution with first or second hand experiences such as these and not dismiss them out of hand because these emotional anecdotes can act as fuel for an anti-vaccination movement.

In Switzerland, Dr. Diana mentioned how the causes of vaccine hesitancy are multifactorial. Bad experiences with vaccines, ranging from direct experience to merely having heard of a case, triggers fear. There are also cultural issues, such as conflicting loyalties between a pro-vaccine wife and anti-vaccine parents of a father, and religious issues. Dr. Diana also mentioned the problem that fake news creates, and how miscommunications and factually incorrect information can spread on social media like a cancer. Scientifically accurate, or at least peer-reviewed, vaccine information, is often inaccessible due to cost-of-access or field-specific language while the anti-vaccination messages are some of the first messages to show up on a Google search for “vaccines” and are easily digestible (A. Diana, personal communication, April 12, 2019).

Ultimately, vaccines have been doomed by their own success. The literature and nearly every expert interviewee mentioned how people don’t have personal experience with the diseases due to the success of the protection of vaccines. In a 2013 review article, it was specifically mentioned that “vaccination is victim of its own success,” as many VPDs are not visible to the general public anymore (Dubé et al., 2013, page 1767). This false sense of security from VPDs

can fuel vaccine hesitancy. In an interview with Dr. Golaz, a physician in Switzerland who has worked as a medical epidemiologist for the CDC, she mentioned how people just don't know the disease [the VPDs] anymore (A. Golaz, personal communication, March 28, 2019). Dr. Diana also mentioned that there is a paradox in that "vaccines are a victim of their own success—don't see any more of the disease due to the success and protection of vaccines," (A. Diana, personal communication, April 12, 2019). Dr. Peyraud also discussed this topic this when comparing between his time on missions with Doctors Without Borders (MSF) and with private practice in Switzerland. He mentioned that in the West, people mostly know the side effects and the anti-vaccination rumors, they don't know much about the actual disease. There is also strong clinical management in Switzerland, so even though vaccine preventable disease fatality is still possible, it is low. This was a stark contrast to his work in Africa, where he said everybody knows a child that died from measles (N. Peyraud, personal communication, March 26, 2019). Decreased awareness about the danger of vaccine preventable diseases is not a problem unique to Europe, Ms. Bahta also mentioned that in the United States, people don't realize that vaccinations are the reason why the U.S. has been a healthy nation (L. Bahta, personal communication, April 3, 2019). No matter where you go, balancing risk is a large part of vaccine hesitancy. When vaccines are successful and the VPDs and VPD-related fatalities decrease, the perceived risk of VPDs decreases as well. Then, when people balance the risk between the side effects of vaccines and the anti-vaccination rumors with the perceived risk of VPDs, vaccine hesitancy increases. This was showcased in the interview with the anonymous vaccine-hesitant Swiss parent, as they talked about how measles isn't as easy to get as it used to be, and no one dies of it anymore (Anonymous individual, personal communication, March 28, 2019).

In short, there is no single cause of vaccine hesitancy, but the development of hesitancy is centered around balancing risk. When there's misinformation in the media about vaccinations, that adds to how parents balance risk. When there's not a public understanding of the suffering of vaccine-preventable diseases, that is not calculated in when balancing risk. When people you trust are advising vaccine hesitancy, that impacts how people balance risk. The problem begins when there is more false information than real information and when people make rational decisions with the information at hand, which will be examined next in a comparison of vaccine perceptions in both the US and Switzerland.

#### **b. United States perceptions.**

The United States is a large and diverse country which can make creating generalizations about perceptions towards vaccines difficult. However, national polls have aided in this endeavor by polling national perceptions and subsequent decisions about childhood immunizations. One such poll conducted in 2014 reported that 90.8% of parents of young children reported acceptance or planning to accept all non-influenza childhood vaccinations, 5.6% reported intentionally delaying one or more vaccines, and 3.6% reported refusing one or more vaccines. The study also reported that nationally these statistics were relatively stable since 2012 (Frew et al., 2018). While this is not a perfect measure of perceptions of vaccines as it does not take into account vaccine-hesitant compliers, it provides a good estimate of the general population. When discussing vaccine hesitancy in the United States, it is good to remember that the vast majority do vaccinate their children. Another study confirmed this saying that "...a large majority of parents vaccinate..." (Wang et al., 2015, page 1). However, they also found that "...high immunization rates do not necessarily imply high confidence in vaccines," (Wang et al. 2015, page 7). Through semi-structured interviews in an upper-middle class neighborhood in

Philadelphia, they found that even parents that are pro-vaccine had concerns about being overwhelmed by freely-available ambiguous vaccine-related information and often did delay their children's vaccine schedules (Wang et al., 2015). So, the large portion of parents that do fully vaccinate may include parents that may be vaccine hesitant, and the smaller portion of parents that do delay vaccines may include parents that are pro-vaccine. National polls and these smaller studies have been helpful in identifying trends but improved sampling methods are needed to identify the perspectives of specific populations within the United States.

A study about decision making surrounding vaccination found that American political leanings and perceptions of establishments also impact vaccine hesitancy. First, the study described the United States as having prevalent political desires for individual freedom and decreased federal intervention. They also mentioned how the "desire for 'toxin-free' lifestyles" and some religious beliefs are also barriers to vaccination (Suk, Lopalco, & Pastore Celentano, 2015, page 2). These personal beliefs about vaccines develop into hesitancy. They also mentioned "a lack of trust in scientific and medical establishments," (Suk et al., 2015, page 2). These general beliefs in the United States impact how the public views vaccines. With increased desire for individual freedom and decreased trust in science and medicine, it's easy to make the leap to the conclusion that people will be hesitant towards vaccines as they will not want a system that they don't trust dictating their lives.

In order to get a better understanding of American perceptions of vaccines, an interview with a leading public health nurse from the State Health Department of Minnesota, Ms. Bahta, was conducted. In her job as an Immunization Clinical Consultant, she was shocked by the amount of misinformation easily available to the public. Often misinformation would be from people with something to sell; people who cherry-pick the CDC recommendations and then use it

out of context to build their case for whichever alternative treatment they're trying to sell, (for example, vitamin C, chelation, ozone treatments, and bleach treatments). She also noted an issue with misinformation about mercury. The mercury from a preservative in vaccines is ethyl mercury, not the dangerous methyl mercury. Even so, ethyl mercury is only in flu vaccines, and this exposure doesn't contribute to the overall mercury load in the body, which is primarily accumulated from methyl mercury environmental exposure (such as eating fish). Even so, most pediatricians use single-dose vaccines which don't require mercury as a preservative (L. Bahta, personal communication, April 3, 2019). Unfortunately, mercury in vaccines eroded public trust in the medical system. Thimerosal, the mercury-containing preservative, was used for years for multidose vaccines. When there was public outcry against mercury in vaccines despite the safety of the preservative, it was removed as a precautionary measure and led to rumors about a cover-up (Dubé et al., 2013). The communication surrounding this decision was inadequate, leading to a decrease in public confidence in vaccines and increased vaccine hesitancy (SAGE Working Group, 2014). Without public trust in the medical establishment, any recommendations given can be suspect, especially concerning vaccines.

Ms. Bahta also spoke about the "shifting goal posts" strategy of the anti-vaccine movement. This refers to changes in the claims of the anti-vaccine proponents as soon as their current claims are disproven, like what was discussed in the literature review with the 2010 paper by Gerber and Offit. In Ms. Bahta's twenty years of experience as a public health nurse, the claims for justification for hesitancy started with blaming vaccines for seizure disorders, then autism, then it was blaming the mercury in the vaccines and then the schedule with too many vaccines at one time. She also mentioned that even when there's good science backing up the position of the health department, the anti-vaccine community finds a way to negate it; for

example, not accepting research because they don't like the established methods of clinical trials. The anti-vaccination community also makes false claims about how the public health department fakes outbreaks in order to get people vaccinated. The movement is integrated within the general community and have the trust of many grieving parents. Ms. Bahta also mentioned that they know of one individual, and have suspicions of others, who have paid parents to publicly propagate false claims that vaccines cause autism (L. Bahta, personal communication, April 3, 2019).

Ms. Bahta also mentioned how for measles specifically, the long-term effects of the disease often aren't known. A parent can think that their child has survived measles, but then ten years later a latent reactivation of the virus leads to subacute sclerosing panencephalitis (SSPE) in which the virus eats away at the child's brain and they die (L. Bahta, personal communication, April 3, 2019). Symptoms of SSPE arise approximately six years after initial infection of measles and have a degenerative course ultimately ending in death within four years (Mekki, Eley, Hardie & Wilmshurst, 2019). Ms. Bahta mentioned how it's hard to get statistics on SSPE because it is fortunately a rare complication of a rare disease. However, there was a recent study from California that estimated the frequency of SSPE to be higher than previously determined (L. Bahta, personal communication, April 3, 2019). A 2019 study found that the condition was reported in 6.5 to 11 per 100,000 cases of measles, and that children who had measles when younger than five years old were at the highest risk for SSPE (Mekki et al., 2019). Without common knowledge of serious side effects of measles such as SSPE, parents do not have all of the information needed to make an accurate risk analysis in their decision on whether or not to vaccinate.

The vaccine-hesitant community is not heterogeneous in America, as evidenced by the Somali population in Minnesota. This is not a population that would typically be identified as likely to be vaccine hesitant (W. Stauffer, personal communication, March 20, 2019); immigrant families are typically very understanding and accepting of vaccines in the United States (L. Bahta, personal communication, April 3, 2019). In the mid-2000s, Somali parents were seeing disproportionately higher rates of autism in their communities with their children in early childhood special education programs, then publicly blamed it on the MMR vaccine (CDC, 2018a). Ms. Bahta spoke about how the Minnesota State Health Department did a study in response to this concern using purely attendance data and found that there were higher numbers of Somali children in programs for autistic children. The study couldn't prove association or even if the higher rate of children being placed into these programs was due to good school identification of learning disability; whatever the cause for the higher rates, the results of the study were taken as proof of the danger of the MMR vaccine and there were many declines in vaccinations after the publication (L. Bahta, personal communication, April 3, 2019). From 2004 to 2010, measles coverage rates declined from 91% to 54% in the Somali-Minnesotan children (CDC, 2018b). The Somali immigrant population is just one example of a population that doesn't align with the stereotypical view of a vaccine-hesitant individual or group, and more research is needed to gain insight into the populations being affected by VH in the United States.

### **c. Switzerland perceptions.**

In Switzerland, Dr. Diana estimated that 5-10% of his patients were vaccine hesitant with the majority of them being concerned but accepting of vaccination. In describing his patients, he noted VH to be a continuum with lots of people in the middle who just have some questions about the science behind vaccines and their associated risks and benefits. He also referenced

literature that he has read that states that on average in Switzerland, if you have 100 patients, 30 will be vaccine hesitant but only one, maybe two, of those 30 will be anti-vaccination (A. Diana, personal communication, April 12, 2019).

There are multiple populations within Switzerland, just as there are in the United States. Dr. Diana talked about how when he has patients who have immigrated to Switzerland from Africa, they all are extremely happy to vaccinate their children and even ask if there are any other vaccines that they could possibly get that are not official recommendations for which they could then pay out-of-pocket. He was taken aback by this response and, when asked why they're so interested in vaccination, the parents of his patients often replied that they had family members who died from a VPD (A. Diana, personal communication, April 12, 2019). His experience is in contrast to the Somali population in Minnesota, USA and more closely resembles what Ms. Bahta typically had experienced with in the past with other immigrant families in the United States.

For measles specifically, the 2014 study by Valeri *et al.* included a questionnaire about perceptions of measles. Overall, 69% of respondents said that they thought that measles was dangerous, and 76.9% thought that vaccination against measles made sense (Valeri et al., 2014). While this was not a fully generalizable sample, it does lend some insight into the perceptions of the Swiss population towards this specific vaccine.

One parent who represents a typical vaccine-hesitant individual in Switzerland was interviewed and asked to remain anonymous. She is a well-educated mother and she requested that her children only get specific vaccines. She didn't classify herself as pro- or anti-vaccine, but as wanting to be smart regarding vaccines and wanting to do research before making decisions. She referenced a book, *Vaccinations: Le doit de choisir*, (in English, this translates to

*Vaccinations: The right to choose*), that greatly influenced her thinking on vaccination. Topics within the book include: balancing risk, concerns about over-burdening of the immune system by receiving multiple vaccines at one time, concerns that the immune systems of children are not developed enough to handle vaccines, and that ingredients in vaccines are toxic. She also was concerned about a potential conflict of interest when there is a financial incentive for pharmaceutical companies to support governmental vaccine recommendations. Overall, her personal arguments boiled down to balancing risk. For example, when her family went on vacation to an area where polio was endemic, she had her children vaccinated for polio due to the increased risk of the disease (Anonymous individual, personal communication, March 28, 2019).

These concerns are sensible when put into context of her worldview and the information that was available to her. Balancing risk is a large part of the decision to vaccinate, no matter who you are, and problems arise when the inputs into the risk equation become skewed. This woman believed in the arguments that had been presented to her, and because she cares about her children she decided not to have most recommended immunizations given to them.

There are two websites that commonly arose over the course of this project regarding vaccine information in Switzerland. The anonymous vaccine-hesitant individual recommended the website [www.infovaccins.ch](http://www.infovaccins.ch), a vaccine-hesitant website (Anonymous individual, personal communication, March 28, 2019). Dr. Diana recommended the website [www.infovac.ch](http://www.infovac.ch), an official website that is pro-vaccination (A. Diana, personal communication, April 12, 2019). Even the similarity in names of these websites shows how the discourse surrounding the topic of vaccinations in Switzerland can be ambiguous and difficult for parents to navigate and find accurate information. Each website gives information on specific vaccines, and each offers links to other websites in French, German, or English for further information. The VH website

provided links to other vaccine-hesitant websites, while the pro-vaccine website provided links to other official websites (INFOVAC, n.d.; Groupe médical, n.d.). The literature states that the internet is often used to spread anti-vaccination messages, although there is little data on linking the exposure to anti-vaccination websites and vaccination decision making (Dubé et al., 2013). Even without these hard data, the similarity of the website's names seems to be a perfect example of how resources can be easily confused by the well-meaning and unsuspecting parent.

The amount and type of information that is easily available and accessible can impact a parent's decision, as seen in the case of the anonymous parent. These two websites offer a starkly different conclusion about vaccines risk and each shape the public perception of vaccinations. The VH website also provides a window into some Swiss providers' perceptions of vaccines as the website was founded by a group of physicians (Groupe medical, n.d.). This confirms the anonymous Swiss individual's assertion that no matter where in Switzerland she's been, she's always been able to find a doctor that supports her decision to not vaccinate her children (Anonymous individual, personal communication, March 28, 2019).

Similar to the United States, the interview with the anonymous vaccine-hesitant individual revealed that SSPE as a complication of measles infection is also not common knowledge in Switzerland; the Swiss parent hoped that her children would get measles when they were younger so it would be a milder case (Anonymous individual, personal communication, March 28, 2019). However, Ms. Bahta confirmed this thought process with one dangerous stipulation—when younger children contract measles, they're more likely to have a milder case, but they're also more likely to die later from SSPE (L. Bahta, personal communication, April 3, 2019). The lack of information about the risks affects parents' abilities to accurately make a risk assessment on vaccinations for their children.

While many parents are not making a fully informed decision, there are also parents who fully understand the benefits and risks related to vaccination, but still decide not to vaccinate. Dr. Peyraud spoke about how he would have some patients like this who would fully understand the concept of herd immunity, but would not vaccinate as they decided that any minimal risk from vaccination would not be worth it if their child would be protected by the majority of others who were vaccinated. He attempts to change their mind by telling how Switzerland is not at a high enough coverage rate to be fully protected from measles and he tells about the potential complications if their child becomes ill. He fears this attitude and its effects on vaccination (N. Peyraud, personal communication, March 26, 2019).

An interesting dichotomy within the Swiss perceptions were how both sides of the debate used similar rhetoric to reach diametrically opposed conclusions. In two interviews, one from a vaccine expert and one from the anonymous vaccine-hesitant individual, their arguments were similar and yet completely the opposite to each other. Both talked about how their side, whether it be the medical community or the vaccine-hesitant community, uses science and facts while the other side is simply relying on belief and blind faith. Dr. Peyraud mentioned how vaccine hesitancy and opinions on vaccinations in general, when the majority of the time patients do not question treatments when they're sick, is about beliefs and emotions surrounding a well child. If a child has a fever or cries or even a seizure after a vaccine, it has a strong emotional impact that will shape the beliefs of the parent. Emotions and beliefs are closely intertwined, and emotions can be stronger than facts in influencing beliefs (N. Peyraud, personal communication, March 26, 2019). The anonymous vaccine-hesitant individual described pro-vaccine arguments that seem solely based on guilt: she feels like she is told that she's a horrible person endangering the world, and that the pro-vaccine arguments are not as clear as the anti-vaccine information. She

also mentioned that it's impossible to have a scientific conversation based on facts with the pro-vaccine side when they use emotional arguments about how she is endangering her children by not vaccinating them (Anonymous individual, personal communication, March 28, 2019). These conflicting perceptions embody the overall observed perception of vaccinations in Switzerland. People want information to make the best decision possible, and they look for it in the best ways they know how.

#### **d. Importance of choosing for another.**

In both countries, a major point to be taken into consideration is the fact that the people making decision about vaccination are choosing for another person, typically their children. This frame shift changes how parents consume information about vaccines and how they come to conclusions about their perspectives on vaccines. This was emphasized in multiple interviews and in the literature review. Dr. Peyraud stated that "it's for your child, not you. You tend to be more careful with your child than with yourself." (N. Peyraud, personal communication, March 26, 2019). The vaccine-hesitant parent also stated about how this was an issue with making choices for their child, not for themselves, and how important it is to give their child the best future possible (Anonymous individual, personal communication, March 28, 2019). The literature indicates that parents are concerned about their child's pain, perceive that there are too many vaccines and that vaccines interfere with normal development of their child. They perceive their child as vulnerable and want to alleviate perceived problems like vaccines (Dubé et al., 2013). Even with parents that choose to vaccinate their children, their decision is often centered around their own child as Dubé *et al.* stated "...even if some parents see the role of childhood immunization in building herd immunity in a positive light, their decision to vaccinate was largely based on the perceived benefit to their own child," (Dubé et al, 2013, page 1770). This

can be complicated by the fact that parents claim to “prefer to rely on their own research on vaccines to come to an informed decision, rather than deferring to their child’s doctor...”

(Peretti-Watel et al., 2015).

The importance placed on creating the best possible future for their children impacts how parents view vaccines. The gravity of the situation and the preference to do their own research means that they’ll be looking towards friends, who may be pro- or anti-vaccine, or vaccine hesitant themselves, and the internet for resources. Dr. Diana mentioned how “fundamentally, their [parents’] motivation is to not to harm their children” (A. Diana, personal communication, April 12, 2019). Mr. Deml stated something similar— “Every parent just wants what’s best for their child,” (M. Deml, personal communication, April 11, 2019). The decisions parents make regarding vaccination is about trying to do the right thing for their kids by balancing the perceived risks.

### **3. Strategies for Addressing Hesitancy**

#### **a. Health care providers.**

There are many different methods of interaction between health care providers and patients, (or parents of patients), but first it is necessary for healthcare providers to decide to engage with the vaccine-hesitant patients. According Dr. Diana, many pediatricians in Geneva do not continue to follow unvaccinated children due to the risk they pose to their other patients despite the literature saying to do the opposite as in doing so it creates clusters of unvaccinated children at the few offices that allow them and outbreaks would be more likely to spread quickly in these situations (A. Diana, personal communication, April 12, 2019). This was further evidenced by the observation that when Dr. Peyraud was a new pediatrician in Geneva, he began

working with some patients because previous doctors refused to follow patients with parents who refused to vaccinate them (N. Peyraud, personal communication, March 26, 2019). This refusal is especially important as a 2015 study suggested that when pro-vaccine physicians refuse to accept vaccine-hesitant families, it indirectly fuels vaccine hesitancy (Peretti-Watel et al., 2015). Dr. Diana is a good case study of the thoughts of medical practitioners. Years ago, he was an example of the type of doctor that wouldn't accept non-vaccinating patients, the type that would say 'if you want to compare your internet search with my medical degree, you can go elsewhere' and refuse to continue to work with them. However, he reversed his decision about accepting vaccine-hesitant parents, noting that the parents are truly concerned and believe that vaccines are threats to their child's health and welfare. Now, he works with many vaccine-hesitant families and engages with them instead of dismissing them (A. Diana, personal communication, April 12, 2019). This corroborates what Michael Deml, a sociologist whose PhD is focused on vaccine hesitancy in Switzerland, said in an interview that it's more complicated than a simple decision on whether or not to accept vaccine-hesitant families into a medical practice. Mr. Deml described how it's difficult for providers since they have pressure from the literature and the media to increase vaccination rates, concern about measles spreading in their own offices from non-vaccinated patients, and interest in not being complicit in the suffering of a child if an unvaccinated child becomes ill by a VPD. Also, he stated how providers are concerned that if they follow the literature suggestion to accept unvaccinated children, their professional integrity will be questioned by other providers through interprofessional judgement (M. Deml, personal communication, April 11, 2019). Yet, even given this strong argument for not accepting vaccine-hesitant patients into a medical practice, Dr. Diana made an analogy that solved his own dilemma: "Imagine I was an oncologist and my patient refused chemotherapy, should I dismiss

them?” (A. Diana, personal communication, April 12, 2019). Dr. Diana also fought the notion that delaying vaccination is giving in, as he said that when parents pick and choose vaccines in an à-la-carte fashion, they’re still getting some protection for their child and once they see that their child can be vaccinated without a problem, he’s seen that they’re more receptive to getting fully vaccinated (A. Diana, personal communication, April 12, 2019). Mr. Deml commented on this delayed vaccination as it being not out of contempt for their child, but just seeing vaccination as not the best option for their kid at the moment even if they’re open to it one day (M. Deml, personal communication, April 11, 2019). Given these two perspectives, health care providers shouldn’t stigmatize those that choose to delay vaccination, but work with them to answer their questions and listen to their fears and give them information that can help them in their healthcare decision making.

Once providers choose to accept vaccine-hesitant families, the issue of how to address vaccine hesitancy in a clinical setting becomes a question of communication. Two similar examples of clinical strategies were provided in the interviews with Dr. Peyraud and Dr. Diana. Dr. Peyraud’s process included not pushing them on the first visit, then on the next visit asking them about their beliefs and feelings and then showing them what should be done according to medical guidelines. He then would read the books that his patients recommended about anti-vaccination before explaining from his understanding why the claims in the books are right or wrong. After this process is complete, he will then ask if they will consider vaccination. Through this process most patients were persuaded to begin accepting vaccinations. He noted that it’s an interactive relationship between the provider and the hesitant parent and that while it takes time, it’s the role of the pediatrician to do so (N. Peyraud, personal communication, March 26, 2019). Dr. Diana had similar strategies. He describes that for those who are truly anti-vaccination, it’s

impossible to immediately change the mind of the parent and parents' opinions have to be respected. However, everyone has the right to their own opinion, but not to their own facts. All a provider can do is give suggestions on what to watch for if a child becomes ill, read the anti-vaccination books in order to be able to understand their perspectives, and ask on occasion if the parent wants to discuss vaccination even though they will rarely change their opinion. For the vaccine hesitant, Dr. Diana similarly stated that he needs to respect their opinions and not to treat them as if they're unintelligent. It's important to first engage with the emotional brain, asking questions like "What does it mean to you, the measles vaccine?", and to understand that they have good intentions for their child. Communicating about understanding parents' fears is important, such as using statements like "Well if I were you and I had your fear, I would probably react the same way," and he stated how parents' faces light up when they feel understood. At this point, when parents see that he understands their perspective but is still convinced about the value of vaccination, he goes into the technical details. It's a difficult strategy and he notes that it is impossible to have a consultation like this in five minutes. The first meeting is typically at least forty-five minutes and he then tells patients that they can return or even send him emails with additional questions as they arise. He is also careful to not be too aggressive with his facts too early as he does not want parents to become defensive or begin questioning his motivations. Throughout this process, he is intentionally using motivational interviewing (A. Diana, personal communication, April 12, 2019).

Motivational interviewing is one method to counteract the false information.

Complementary and alternative medicine (CAM) providers are often associated with promoting VH in the literature (certain CAM providers implicated by Glatman-Freedman & Nichols, 2012; homeopaths more likely be against vaccinations, especially MMR—Dubé *et al.*, 2013), yet Mr.

Deml commented that there is some justification in his work that CAM providers are using motivational interviewing to address the social determinants of VH by listening and working on trust in the system (M. Deml, personal communication, April 11, 2019). Mr. Deml referenced other provider strategies as well, such as giving facts, talking about personal clinical experiences, talking about decisions that the provider would make for their own kids while making sure to advocate for self-determination, and simply listening (M. Deml, personal communication, April 11, 2019). Throughout all of these clinical strategies, one of the biggest factors to take into account is that addressing vaccine hesitancy takes time, but it is worth the patience for the patient.

There are communication strategies available in the literature for healthcare providers. This is vital given that “information or reassurance from a health-care provider was the main factor in changing the decision of parents who had planned to delay or refuse a vaccine for their child,” (Dubé et al., 2015, page 11). A strategy out of the U.S. was similar to the strategies described by Drs. Peyraud and Diana. It was the C.A.S.E. approach—Corroborate, About me, Science, and Explain/Advise. It dictated that first a clinician should corroborate the concern by acknowledging it, then for “About me” portion explain how the clinician became an expert, then give the science in an understandable manner, then finally explain why they have strong feelings about this topic and why the clinician believes it is best for the patient (Jacobson, Van Etta, & Bahta, 2013). Another study showed a presumptive approach (assuming that parents will vaccinate) rather than a participatory approach (asking whether the parents want to vaccinate) was more effective for having parents accept vaccinations, but patients rated the visits higher when providers used a participatory approach (Opel et al., 2015). However, Mr. Deml stated while this article was promising, it did not reflect the reality of the visits he had observed as they

were often much messier than the researchers portrayed—it was hard to have one approach or the other since there were interruptions, off-topic questions, distractions, and plenty of other topics to cover in a single visit as well as having to start over and explain the topic in a different way if parents don't understand. For example, one doctor he observed started the conversation with “So, vaccinations.” as neither a question or a presumption, which is difficult to code for research (M. Deml, personal communication, April 11, 2019). Even with these limitations, given the paucity of studies on provider communication studies, the article by Opel *et al.* should be taken into account when providers approach parents who are vaccine hesitant. The SAGE Working Group also advocated for the strategy of simply talking with and listening to patients, as a review of successful interventions included dialogue-based interventions, “particularly those incorporating a focus on community engagement/social mobilization and the improvement of health care worker communication” (SAGE Working Group, 2014). Throughout all of these methods and fine details, provider strategies for addressing vaccine hesitancy can be encapsulated by one word: communication.

Provider communication not only encompasses providing information, but also teaching the patient/parent how to evaluate information. In the United States, Ms. Bahta teaches through talking with people about websites that are governmentally sponsored, pharmaceutically sponsored, or neither, and how to check if a source of information is attempting to sell anything (L. Bahta, personal communication, April 3, 2019). In Switzerland, Dr. Diana describes cognitive biases for his patients/parents, gives a recommendation to use Google Scholar instead of Google, advises seeing if information is related to another source, and finally recommends to check if websites are a “.edu” or “.gov” site and to evaluate information from these sites as more reliable (A. Diana, personal communication, April 12, 2019). These strategies are useful in that

so much of vaccine hesitancy is caused by misinformation and misperceptions, and by giving strategies to evaluate information sources healthcare providers can help patients to navigate the plethora of information available on vaccines.

Within any clinical strategy for providers which addresses vaccine-hesitant parents, it is important to be aware of the power of emotions. Dr. Diana spoke about how there is a lot of research in cognitive science on decision making and the emotional part of the brain. When a person makes a decision, they're basing it off of the input they've gathered. The amygdala, a part of the brain that is important for fear and aggression, is involved in decision making. When there are emotional inputs, like seeing a fever in a child, that's encoded in the brain as something to avoid. It's vital to understand what inputs are present in this decision-making equation—when providers can understand these inputs, they can give new inputs for patients to think about and can go about showing patients new data slowly. New data could be a singular vaccine that subsequently does not produce a reaction and is judged as safe by the brain (A. Diana, personal communication, April 12, 2019). Mr. Deml spoke about how it is “much easier for some patients to talk about emotions than to talk about evidence, facts, or figures,” in a clinical visit (M. Deml, personal communication, April 11, 2019). Ms. Bahta mentioned a similar trend in the United States in that vaccine hesitancy for “the large scope of parents is a very much emotional or visceral stance rather than a scientific stance,” (L. Bahta, personal communication, April 3, 2019). The literature noted that “dry statements on probabilities are not as powerful as anecdotal and emotion often used in anti-vaccination claims,” showing just how important it is to be aware of emotions in this discourse (Dubé et al., 2013, page 1767). However, even though it is important to be aware of emotions and take them into consideration in a clinical setting, providers should be careful to clearly base their recommendations on evidence lest they come

across as manipulative, as having blind faith in pro-vaccination claims, and emotional like the perception of the pro-vaccine side from the anonymous Swiss parent's perspective. Balance is vital—providers should be aware of emotions and their impact yet they should not rely solely on an emotional argument.

### **b. Public health.**

Both the United States and Switzerland have national vaccination strategies, and each include some information on public health strategies regarding hesitancy. In the United States, the CDC published a national vaccine plan from the U.S. Department of Health and Human Services that includes information to improve informed decision making by both consumers and health care providers. Goal 3 of the plan includes “accurate, timely, transparent, complete, and audience-appropriate information about immunizations and vaccines,” as well as collaboration with public health decision makers and increasing public awareness of vaccines (U.S. Department of Health and Human Services, 2016, page 26). This is a noble attempt at addressing some of the observed causes of vaccine hesitancy, though it was very vague in how they would go about these goals. Switzerland's Federal Office of Public Health published the National Vaccination Strategy due to the mandate by the Swiss Epidemics Act, and it includes information on challenges and potential action points in increasing vaccination rates. Challenges, including the negative information about vaccines on the Internet as well as efficient collaboration between all relevant parties, have to be addressed in order to meet the objectives of increasing access to vaccines and having a public perception that vaccinations are essential. Measures like encouraging health-care providers to give advice about vaccines, increasing communication to the general population, and establishing an electronic vaccination record are efforts to address these challenges (Federal Office of Public Health, 2017). Both of these

strategies focus on communication and collaboration, but neither mention VH explicitly. In order to address a problem, it should be first acknowledged.

There are many general public health strategies that are in use within the two countries. In the United States, many vaccinations are mandatory insofar as there is required documentation of either vaccination or exemption (for medical or conscientious objection) in order to attend school or childcare (L. Bahta, personal communication, April 3, 2019). On a national level, 48 states allow exemptions from vaccine requirements for religious reasons and 21 for personal beliefs (Glatman-Freedman & Nichols, 2012). This United States immunization law is a large difference between the two countries as in Switzerland all vaccinations are completed on a completely voluntary basis. Even though it is possible to avoid school and childcare or to get a waiver of conscientious objection in the United States, this immunization law is a strong aid to increasing vaccination rates at the public health level. Ms. Bahta also mentioned how the State Health Department answers calls from the public in which they help to sort through misinformation, respond to the concerns of those that simply want to argue, and listen and find a way forward for those that have had a reaction to a vaccine. They also offer resources to clinicians and support the norm of vaccinating through advertising (L. Bahta, personal communication, April 3, 2019). This is in contrast to Switzerland where advertising for vaccination is still not fully realized and is a proposed future measure for addressing VH (N. Peyraud, personal communication, March 26, 2019). There are public health strategies regarding VH in Switzerland, such as the Epidemics Act and the National Vaccination Strategy discussed above, however, they're not well known as even Dr. Diana said that there weren't any public health policies for VH in Switzerland besides minimal work on awareness (A. Diana, personal communication, April 12, 2019). Mr. Deml spoke about how the Epidemics Act only allows

mandatory vaccination in the case of an epidemic, and that there are not clear protocols so the act is unlikely to be implemented. There are vaccine recommendations from the Federal Office of Public Health who then shares them with the cantons (M. Deml, personal communication, April 11, 2019) but without an immunization law, there isn't a force behind the recommendation. Dr. Peyraud even mentioned the concept of governmental vaccine hesitancy where the Swiss government decided not to recommend the Rotavirus vaccine since it was less of a risk to have the virus and deal with its illness than to recommend the vaccine with its own rare, but potentially fatal, complications (N. Peyraud, personal communication, March 26, 2019). Even given the possibility of governmental vaccine hesitancy and the lack of power behind the vaccine recommendations, Switzerland has had success with school vaccination programs in that schools with HPV vaccine programs have much higher coverage (M. Deml, personal communication, April 11, 2019). It's a different method of targeting vulnerable populations than the United States often uses, but the data show it to be effective. Each country uses their own public health policies, and given the results, both countries could learn from the other.

Communication on a public health level and not just a provider level is also important. There are large issues with false information, particularly on social media (L. Bahta, personal communication, April 3, 2019). However, so far educational or informational public health interventions have not been effective despite the abundance of inaccurate information (Dubé et al., 2013). Minnesota has attempted to alleviate this misinformation through the informational call lines, reinforcing the norm of vaccinating, and telling parents thank you for choosing to protect your child, (L. Bahta, personal communication, April 3, 2019). Switzerland has attempted to do the same informational distribution in the website Infovac (A. Diana, personal communication, April 12, 2019). More still needs to be done in both countries to disseminate

accurate information to the public. Public health communications also need to focus on the delivery of the message, as highlighted by the example of the failure in effective communication when thimerosal was removed from vaccine formulations. There needs to be more public health education of providers as well. Dr. Stauffer spoke of the issue of gelatin as an ingredient in the flu vaccine preventing people of specific faith groups from being vaccinated; more public health work is needed to increase provider awareness and patient self-advocacy for a flu vaccine with an alternative formula that doesn't contain gelatin (W. Stauffer, personal communication, March 20, 2019). Given the religious exemptions from U.S. immunization laws, it's important to address all potential barriers to vaccination that could arise due to religious objection.

Public health measures need to address trust in the medical system. As discussed in the *Perceptions* section, public trust in the medical system and in health-care providers themselves is a large determinant of vaccine hesitancy. Communication of the mercury removal from vaccines was poorly implemented in the U.S., and both countries could improve public health communication in order to increase public trust in the medical system.

### **c. Proposed procedures.**

The largest proposed solution to address vaccine hesitancy is that of compulsory vaccinations, though it is controversial in the United States and even more so in Switzerland. The U.S. already has mandatory flu shots for health-care workers and before school attendance (SAGE Working Group, 2014), but there are exemptions available (L. Bahta, personal communication, April 3, 2019). Dr. Peyraud commented that as soon as you oblige something, people tend to be against it on principle. In addition, one of Switzerland's core national identities is that of autonomy, which includes letting the population decide whether or not they will choose to be vaccinated or have their children vaccinated. This was evidenced by a 2014 study that had

less than half of respondents agree with mandatory measles vaccination even though the same study had a majority respond that they believe that measles is dangerous and vaccination makes sense (Valeri et al., 2014). The ability to choose whether or not to vaccinate is both a right and a responsibility, and it is assumed that with this privilege people will have more motivation to become informed and reflect before making a decision (N. Peyraud, personal communication, March 26, 2019). Dr. Diana is in agreement on this and prefers education to force about vaccines, but he offered an interesting perspective on compulsory vaccinations through the story of one of his patients. This patient was a French woman who came for a vaccine hesitancy consultation, and even after the consultation was still adamantly against vaccines. In 2018, after France made vaccinations mandatory, Dr. Diana contacted her to ask what she did, and she responded that she did all of the vaccinations. With the shift of the burden of responsibility from her to the state, she vaccinated her children (A. Diana, personal communication, April 12, 2019). This was consistent with the literature that stated how VH may result from the focus on patients' involvement in their own health-care decisions (Dubé et al., 2013). So, with shifting locus of power from the patient involvement in the decision-making to the state mandate, the hesitancy decreased. There is a similar debate in the U.S. despite the current immunization law. Ms. Bahta mentioned how she can understand the desire for having only medically-exempt children be unvaccinated as schools are perfect receptacles for spreading measles and pertussis, but taking away the personal belief exemption leads parents to perceive losing autonomy, thereby giving power to the anti-vaccination community (L. Bahta, personal communication, April 3, 2019). While this effect would be the opposite of what Dr. Diana observed, it is still a possibility. Given the risk of destroying the trust between the medical community and patients, compulsory vaccinations should only be enacted if other options haven't resolved public health crises or if

data from countries with compulsory vaccinations, like France, suggest that the fears of alienation are unwarranted.

There are other proposed solutions for decreasing vaccine hesitancy and increasing vaccination rates. Ms. Bahta's suggestions include making the data on the immunization rates and exemption rates at schools and childcare facilities publicly available in order to increase peer pressure and create consumer-level demand rather than top-down policies (L. Bahta, personal communication, April 3, 2019). Dr. Diana proposed increasing health care provider education on vaccines and how to address vaccine hesitancy, as well as the time allotted for VH consultations. He stated that he hopes that one day there will be VH consultations available at every university hospital in the world (A. Diana, personal communication, April 12, 2019). Dr. Peyraud suggested using advertising strategies for accurate information about vaccination to counter the advertising that the anti-vaccination campaigns do (N. Peyraud, personal communication, March 26, 2019). This advertising can be useful for large-scale marketing and social media, but the success is not guaranteed and there is a large financial cost to large-scale campaigns (Nowak et al., 2015). All of these proposed solutions need to be studied for their effectiveness and any potential downsides.

### **Conclusion**

Vaccine hesitancy is a complex topic and does not have a straightforward cause or presentation, yet it is vital to understand it better in order to address root causes of decreasing vaccination rates and to improve global health.

Switzerland and the United States were analyzed for their perceptions of vaccines. Norms surrounding vaccinations are powerful, and extremely context-specific. Overall, as vaccines have

been successful in decreasing the number of cases of VPDs, VPD-related morbidity and mortality has become less commonly known and a false sense of security developed surrounding a lack of vaccination. Perceptions of vaccines vary at a population level as specific subpopulations hold beliefs about vaccines that lead to under-vaccination, thus not reflecting the national statistics on vaccine coverage rates and leading to the possibility of outbreaks. There is also variation of perceptions regarding vaccines on an individual level as beliefs about vaccination can vary vaccine to vaccine.

There are some consistent factors in the VH movement in both the U.S. and Switzerland; VH centers around risk management and parents choosing what they believe to be the best option for their children. Yet, in this risk-management equation, false narratives can develop which affect the parents' calculation. Multiple hypotheses have been proposed by the anti-vaccination community as to why vaccines should not be considered safe and there is easy accessibility to a plethora of false information regarding vaccination. This information is often written in a more accessible manner to parents than scientifically-based information.

Switzerland and the United States already have some strategies in place to address VH. Due to the aforementioned parental risk management decision making, many of the analyzed strategies addressing vaccine hesitancy center on communication and modification of the decision-making process to include more verifiable facts. For providers, this increased communication includes clinical communication strategies which varied between the countries. On a public health level, both countries have utilized education as a major component in decreasing the proportion of the population expressing vaccine hesitancy. Although there were many similarities between the United States' and Switzerland's approaches to providing increased communication and education, major public health strategies to address VH differ

between the countries. In the United States state and federal level public health agencies focused on immunization laws and social requirements while in Switzerland the focus was on voluntary school vaccine campaigns. So far, there has not been a single strategy that has been shown to be the most effective in addressing VH, though there is evidence for using a multi-strategy approach.

Communication depends upon trust, whether in the provider or in the larger system. Trust also plays a large role in vaccine hesitancy as parents will be unreceptive to either public health measures or attempts at engagement by health care providers if they lack basic trust in the medical system or in their provider. Emotions are involved in the decision-making process of the parental assessment of risk and strategies regarding VH should reflect this, yet the provider should be careful to not come across as manipulative or basing their arguments solely on emotions.

Overall, it should be noted that communication between the pro- and anti- vaccine movements should have more civility and respect from both sides. It is impossible to have useful discourse with the presence of disagreements about basic perspectives such as which side is the one relying on beliefs rather than scientific facts or if all scientific studies are polluted by conflicts of interest.

Many possible solutions have been proposed for addressing VH. Compulsory vaccinations laws are a possibility, although there are questions regarding the effectiveness and public perceptions of this solution. Others include increasing peer pressure through publicizing immunization rates of schools and increasing education through making vaccine consultations available at all university hospitals. There are ample opportunities for new initiatives to be tested.

Timely, efficient, and evidence-based policies need to be enacted and expanded in both the U.S. and Switzerland. Both countries need to increase provider awareness of VH and effective communication strategies. Switzerland should clarify the protocols of the Epidemics Act to give direction during outbreaks. The United States should promote the literature recommendation of not refusing to treat patients that refuse to vaccinate.

More research is needed on the entire topic of vaccine hesitancy. There is not sufficient data on vaccine perceptions in the United States nor on coverage rates in Switzerland. More interviews with vaccine-hesitant individuals in both countries as well as vaccine-hesitant health-care providers should be conducted to gain a broader view of the VH movement and their concerns. Proposed solutions should be tested on a small scale and scaled up if shown to be effective. It should be remembered that parents, providers, and the overall medical system have the same goal—the health of children—and communication between the parties should reflect this reality.

### **Abbreviation List**

CAM: Complementary and Alternative Medicine

CDC: Center for Disease Control and Prevention

FOPH: Federal Office of Public Health

MMR: Measles, Mumps, and Rubella

MSF: Médecins Sans Frontières (Doctors Without Borders)

NIS: National Immunization Survey

SAGE: Strategic Advisory Group of Experts

SIT: School for International Training

SSPE: Subacute Sclerosing Panencephalitis

UNICEF: United Nation's Children's Fund

US: United States

VH: vaccine hesitancy

VPD: vaccine-preventable disease

WHO: World Health Organization

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